6. Modifying variables in Wolfram SystemModeler

This video explores the interactive notebook environment of SystemsModeler, which allows the user to specify and change initial conditions, parameter values and signal functions. The video also demonstrates how to modify more than one variable at a time.

Transcript

**Chris:** [00:00:20] So here we are. Video number six, we're going to look at now how we can use our standard models that we've taken in and just use generic values on those as created by Wolfram. We're going to know look at putting specific values on certain aspects of them.

**Chris:** [00:00:37] So we should have an SystemModeler taken in our LossyGearDemo1. If we now go down into the simulation center, we'll see that we've got our gears here. So DriveSine as the area they want to look at. Two things I'd like to change. First one's going to be frequency, which I believe is currently set at 1. So a frequency of one hertz and the amplitude, so modify the frequency, first of all. So we go back to our notebook here. I'm going to look at that. We're back in Lossy gear demo. So here we just type in sim again and equals and then system model simulate. And then we'd open our square brackets and then drop down a line that just makes it nice and easy to read. So I'll type in our model LossyGearDemo1. See that sort of populated. Then put a comma the end of that. Open with less than sign vertical line and then some inverted commas. And we type in parameter values inverted, commas and that funny, arrow again. And then we opened some curly brackets and then we take the exact syntax of how it is from the simulation center. So we noticed it was DriveSine dot f r e q capital H z. And I'll need some inverted commas in front of that. So just go back, modify this, back to here, close our inverted commas, pointy arrow. Then we give our numeric value. I'll say five. Okay. Close our curly brackets again. And then just closing that set sequence of brackets so vertical greater than sign. And the last one would be the square brackets to complete the brackets from up here.

**Chris:** [00:02:49] So if we know to shift, enter. It should run through that, we should see that it's done on model from there, so it's generated all the data we need.

**Chris:** [00:03:01] Now we just need to somehow plot that. We'll just do system plot. SystemModel plot. And then square brackets sim, which was our variable name shift Enter. SystemModelPlot, as here system, there we go. So now we've got our graphs coming up. And again, we can resize those with image size command if we want to make them larger.

**Chris:** [00:03:40] OK, so that's part one, that's just modifying one variable. We can now manipulate two variables at once or two variables and then we'll look at doing two variables at once as well. So give them another variable name, we'll call it sim one and then specifically look at certain part. So we'll do system model Simulate. And then open our square brackets, will drop down. Again, put in our model name, lossy gear one, close our parenthesis, comma.

**Chris:** [00:04:19] And then we need certain pieces of syntax that have to go here. So less than open brackets, inverted commas. And we'll do parameter value. And close our brackets do the pointy arrow. And then again, DriveSine, drive, sine. I'll do dot freq H z. DriveSine.freqHz close brackets or maybe make it 10 this time just for change with a pointy zero. And then we'll close our curly brackets, so we'll just make sure that we get all our braces correct. And that one and that one. And then close to square brackets. That was the wrong button. That's that one. Here we go I need demo one here.

**Chris:** [00:05:37] So we've now generated one set data that's for the frequency that we've used. I will now go back and unashamedly cut and paste this so control see go back to where that cursor horizontal again. That's where we put our instructions in Control V. You'll see now that it's pasted this back in. But we need to change that to take account for our amplitude that we want to change. So we'd create another variable. Call it sim two. I'll just work through these slowly. So we've got square brackets, parameter values. We remember from sim Center this was DriveSine dot amplitude.

**Chris:** [00:06:23] I'll just quickly flick back to here. We'll see that amplitude is the one there, and when we hover over that, that it says DriveSine.amplitude. Just ensuring that. And we'll change that to say three. So that's the height of the wave. I'll do control Enter and it should generate some data with that. It having a think so perfect.

**Chris:** [00:06:50] So now we've got data set number one, dataset number two. We can plot those with one single command both on the same graph. So if we do system, model, plot. And open our brackets. And before we would have just typed some in here, we actually put some curly braces round the next part, so shift curly braces.

**Chris:** [00:07:18] And if we type in our values, sim one sim two. That's our two datasets. Close the curly brackets. Close the square brackets. Shift Enter again. And here we have now, and it's starting to get a bit messy with various other things going on. But we've got a simulation, one data for the inertia power loss for those specific values. So remembering back up to here, we said the frequency was 10 hertz and the amplitude was three. So it's generated some nice graphs for us there.

**Chris:** [00:07:53] So we've plotted those two perfect. Can we generate this over a longer period of time? Because as we look at this, now back up here, It says time zero to half a second. Say we want to run the simulation for 10 seconds. Can we do that? The answer is yes. So what we would do, we would say, and give it another variable name. Call it sim 3. Or we could reuse use any of those others as well if we want. I will call it sim three. So if you do sim 3 Systemmodel sim. Again typing simulate. OK. And then we open our square brackets and we call our model Losey Gear 1 OK. So that's just calling our model name LossyGearDemo1.

**Chris:** [00:08:56] And then if we just do a comma and stick in a number after that, that will do the time. So 10 close brackets. Again, remembering syntax. So I've got an extra y there, so if I do SystemModele simulate Losey gear demo one. Just hit shift enter at this point and it should pop up with that window for that duration of time. And again, if we go system model plot. I will call it sim 3. Square brackets sim 3 close square brackets. We'll now plot that data over a 10 second period.

**Chris:** [00:09:44] Here we go. So we can see yes that our time is working, right. Ten seconds on our graph.